

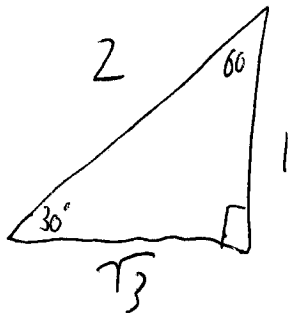
Math 16A: Short Calculus I
 Fall 2017, Section 3
 Homework Sheet 5
 Due: Monday, October 30, 2017

Submit your solutions to the following problems in lecture on the due date above. Present your work in a clean and organized fashion, either on a printed copy of this document (preferred) or a separate sheet of paper. As stated in the syllabus, late submissions will **not** be accepted.

1. Use special triangles to evaluate the following expressions. For each, draw the corresponding special triangle and label all side lengths and angles.

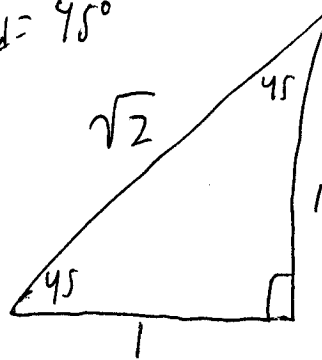
$$\sin\left(\frac{\pi}{6}\right) = \frac{1}{2}$$

$\frac{\pi}{6} \text{ rad} = 30^\circ$



$$\tan\left(\frac{\pi}{4}\right) = 1$$

$\frac{\pi}{4} \text{ rad} = 45^\circ$



2. Compute the following derivative using *only* the derivatives of $\sin(x)$ and $\cos(x)$.

$$\begin{aligned} \frac{d}{dx} \cot(x) &= \frac{d}{dx} \left(\frac{\cos(x)}{\sin(x)} \right) = \frac{-\sin(x)\sin(x) - \cos(x)\cos(x)}{\sin^2(x)} \\ &= \frac{-(\sin^2(x) + \cos^2(x))}{\sin^2(x)} = \frac{-1}{\sin^2(x)} = \boxed{-\csc^2(x)} \end{aligned}$$

3. Compute the following derivatives.

(a) $\frac{d}{dx} \sin(x^2 + 1) = \cos(x^2 + 1) \cdot 2x$

(b) $\frac{d}{dx} \tan(\sec(x)) = \sec^2(\sec(x)) \cdot \sec(x) \cdot \tan(x)$